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Methods of destruction of small arms, light weapons, ammunition and explosives

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I. Introduction

1. On 24 September 1999, the Security Council convened its first meeting at the ministerial level devoted to the issue of small arms. The present report is submitted in accordance with the penultimate paragraph of the statement issued on 24 September 2000 by the President of the Security Council on behalf of the Council (S/PRST/1999/28, see annex I), in which the Council requested the Secretary-General to "develop a reference manual for use in the field on ecologically safe methods of weapons destruction in order better to enable Member States to ensure the disposal of weapons voluntarily surrendered by civilians or retrieved from former combatants". The Council also invited Member States to facilitate the preparation of such a manual.

A. Background

2. The present report was prepared with the assistance of a number of governmental experts (see annex IV) and in collaboration with relevant United Nations bodies through the Coordinating Action on Small Arms mechanism. The report highlights the advantages and disadvantages of various practical destruction methods currently available and their environmental impact. Annex III reflects a possible format of the reference manual to be prepared subsequently for use in the field.

3. Past practice and research in the field of destruction have led to the current assumption that there are no completely ecologically safe methods of destroying small arms and light weapons without significant cost,[1] and, at the suggestion of the United Nations Environment Programme (UNEP), it has been decided that it is more realistic to use the term "environmentally sound".

4. To date the principal work in this area has been undertaken by the Bonn International Centre for Conversion (BICC),[2] the Monterey Institute of International Studies (MIIS)[3] and the United Nations Development Programme (UNDP)/Department for Disarmament Affairs Albania Gramsh Pilot Weapons in Exchange for Development Project.[4] Their work has served as a primary basis for this report and has been heavily drawn upon.

B. Aim

5. The present report is intended to provide guidance for the production of a reference manual for use in the field on environmentally sound methods of small arms and light weapons destruction, including the related ammunition and explosives. Sections II and III of the report deal, respectively, with the destruction of small arms and light weapons; and ammunition and explosives. Section IV provides an overview of issues related to destruction and section V contains a number of conclusions and recommendations.[5]

C. Scope

6. The weapons covered by the report (and the future manual) are those small arms and light weapons, ammunition and explosives as defined in the 1997 report of the Secretary-General on small arms prepared with the assistance of the Panel of Governmental Experts on Small Arms.[6] The exception will be landmines, which are, in part, the subject of a separate destruction protocol developed by UNDP[7] in the context of the Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-personnel Mines and on Their Destruction.[8]

7. The report identifies all practical methods of destruction, and the advantages and disadvantages of each method are outlined to the extent possible. Although there are common elements in the destruction of small arms and light weapons, on one hand, and ammunition and explosives, on the other, there are also significant differences. As a consequence, section II includes a somewhat detailed description of destruction methods for small arms and light weapons. Because of the higher skill levels required for destruction of ammunition and explosives, section III has less detail owing to the fact that destruction of ammunition and explosives is much more complicated than the destruction of inert weapons. Conversely, it is envisaged that the degree of content will be reversed in the field reference manual.

8. It is critical to emphasize at the outset that the information in the present report, and in the field reference manual, is for planners and managers tasked to develop plans for, and provide oversight of, destruction programmes. The report and the field reference manual are not substitutes for the detailed information that will be found in national training material and manufacturers manuals. Only trained and qualified personnel should be employed in the supervision and execution of destruction programmes.

9. The emphasis in the present report is on field destruction methods that would be utilized primarily in the context of post-conflict situations. The report does not deal with stockpile management and destruction, i.e., large-scale destruction or demilitarization by national Governments.

10. The United Nations has a strong commitment to the preservation of the environment in all circumstances, to the extent possible. Consequently, special attention has been devoted to assessing the environmental impact of each method, in particular with respect to the destruction of ammunition and explosives. Furthermore, in addressing the environmental impact of destruction methods, consideration has been given to both the methods employed and the environmental circumstances at the location where the destruction would take place. Discussion with local authorities would be necessary to ensure complete knowledge of local conditions. Opportunities for the recycling of materials would be examined from both environmental and cost-effectiveness perspectives.

11. Annex III provides an example of a possible format for the destruction methods aspect of the field reference manual. This format is recommended to future authors of the field reference manual with respect to layout and scope. It illustrates a specific destruction method with a specific weapon type, presented in a step-by-step approach, including information on safety, environmental impact (including possibilities for recycling), and other advantages and disadvantages. Photography would be used for illustration purposes and appropriate supporting information such as industry association contacts would be identified. The latter would facilitate

access to information on the acquisition of existing military and commercial equipment.

12. It is envisaged that the basis for approved and standardized terminology would be addressed in the field reference manual in two separate annexes containing a glossary of terms and an explanation of abbreviations and acronyms. In order to facilitate the acquisition of equipment by those responsible for destruction programmes, the manual would also include an annex with the Internet web sites of industry associations. Industry association information is more current than that of individual companies.

D. Principles

13. The primary principle is that safe destruction should be the overriding objective in operations designed to reduce or eliminate weapons, ammunition and explosives collected or rendered surplus for whatever reason. The overall objective is to ensure that weapons can never be used to fire again and that ammunition and explosives are rendered completely inoperable and present no hazard to personnel engaged in the destruction process, the population at large and, to the extent possible, the environment. In designing a destruction programme, planners, managers and operators must bear in mind the following principles, not necessarily in the order presented. Priority would be dictated by the specific circumstances:

(a) **Equipment**. The conditions under which destruction would take place could range from very austere to fairly sophisticated. The availability of equipment, together with an assessment of its reliability and maintainability, would be a major factor in deciding on the method of destruction;

(b) **Cost**. Cost would include both the acquisition of equipment for destruction and operational costs. It would be essential that cost be considered in relation to the wide range of benefits that flow from a destruction programme. An indigenous workforce should be used to the maximum extent possible consistent with safety and security. While opportunities for cost recovery through the recycling of scrap materials should always be a consideration, significant cost recovery would not be likely. Wherever possible, existing infrastructure should be utilized to the maximum effect;

(c) **Security**. From the initial collection of weapons, ammunition and explosives, through to their eventual destruction, the security of the items collected must be assured. Storage, transportation and the provision of a security force must be considered;

(d) **Simplicity of operation**. The destruction task could often be challenged by a lack of ideal resources, trained personnel, the urgency for action and other factors. This would mean that methods of destruction must be realistic in the light of the prevailing circumstances on the ground. In such an environment, simplicity would be an important objective;

(e) **Safety**. Lack of resources, time pressure and other constraints must never imply that safety would not have the highest priority in any destruction operation. The presence of explosive ordnance and the use of industrial equipment in many cases would call for extra vigilance;

(f) **Environmental impact**. Although, as described above, there are no completely ecologically safe procedures in the destruction of small arms and light weapons and ammunition and explosives, there are steps that must be taken to minimize the impact on the air, the ground and the water environment. Pollution control measures must always be considered in destruction planning. The collection of scrap and residue would assist in minimizing the impact on the environment;

(g) **Accounting**. From the initial assessment of the amount of weapons, ammunition and explosives involved in a particular operation through to the actual destruction and disposal, there must be an accurate and detailed account of the material involved, consistent with the operational circumstances;

(h) **Transparency**. Accounting must be in a form that is understandable by the war-affected population from beginning to end. This is an essential confidence-building measure for civil society. The use of international observers, non-governmental organizations and the media could contribute to the value of this endeavour.

E. Ceremonial destruction

14. Experience with ceremonial destruction of weapons has been proved to have a very significant impact on conflict-affected populations. It is very effective when there is a presence, and ideally participation, by those who have been directly involved in the conflict.

15. The most visible and symbolic ceremonies have usually involved burning, such as a bonfire, but there has also been a favourable public response to events where weapons have been crushed by tracked vehicles. The public detonation of ammunition and explosives has also had a powerful effect. In any case the ceremony would have to have been well advertised and celebrated in a location where there could be a significant viewing audience. Care must be taken to ensure that the indirect costs of destruction are not exorbitant because of an overly elaborate ceremony.

16. It is not necessary to publicly destroy at one time all of the weapons, ammunition and explosives that are due for destruction, but it is necessary that the conflict-affected population is convinced that there will be complete destruction by the end of the programme.

17. In order to reinforce the message delivered in the initial destruction ceremony, it is often useful to have a commemorative or remembrance ceremony on the anniversary of the original event. In order to assist commemoration, a monument or some form of permanent reminder is very valuable. By example, in Albania a three-metre-tall peace bell in Tirana was cast from the brass ammunition cartridge cases collected by children. In Mali, the site of the original peace flame in Tombouctou is marked with a peace monument that incorporates remnants of the weapons destroyed. In addition, an adjacent park, the peace garden, contains trees planted by individuals, Governments and organizations that supported the peace process. Finally, in the capital, Bamako, concurrent celebrations are held each year to celebrate the original peace flame.

II. Destruction of small arms and light weapons

A. Introduction

18. From the numerous cases in which small arms and light weapons have been collected, seized or otherwise declared surplus, a number of practical methods have been identified for their destruction. These methods can range from very cheap and simple to more complex and expensive. A number of considerations have to be made when choosing a destruction method. These considerations include: quantity and type of weapons collected; time and location restraints; requirements of security and government involvement; psychological and publicity needs, such as the building of a peace monument with destroyed weapons; national infrastructure (roads, equipment availability and domestic recycling capabilities); labour costs; and overall implementation.

19. Whatever method is chosen, a number of common preparatory tasks need to be undertaken. These include collecting the weapons, ensuring that they have been rendered safe (e.g., contain no ammunition), implementing and maintaining a chain of custody and accountability, sorting and segregating the weapons, inventorying and transferring them to temporary storage or directly to the destruction site. At the same time it is necessary to ensure that environmental concerns have been taken into account and that a verification system is in place to certify destruction. Within the organization tasked with carrying out the destruction operation, e.g., a peacekeeping mission, it must be clearly understood who has the authority to order destruction and to determine the method or methods to be used.

B. Methods of destruction

20. The following is a description of some of the most common methods that have been used for the destruction of small arms and light weapons. The purpose is not to rank or recommend any particular method, but simply to present the technical necessities and constraints of each method, as well as more general advantages and disadvantages. The list is not exhaustive, as there are a multitude of ways that a weapon can be made inoperable or destroyed.

Burning

21. The two burning methods discussed here are at opposite ends of the spectrum ranging from the cheap and simple to the complex and possibly costly:

(a) **Open-pit burning**:

(i) Open-pit burning has been effectively used in a number of situations. It is a simple and cheap way to destroy weapons successfully. The only materials necessary for this method would be some type of fuel (wood or coal) and a flammable substance to intensify the heat (gasoline for example). The only skills needed would be in rendering the weapons safe, stacking the weapons to maximize their destruction and verifying the destruction complete. An additional safety measure would be to have all muzzles of the weapons pointing in one direction and forbidding the presence or movement of unauthorized personnel during the burning;

(ii) Burning has the added advantage of making a highly visible, political and psychological statement to the conflict-affected population;

(iii) However, one of the main disadvantages of burning is its ineffectiveness if there is not sufficient heat produced. This could be overcome by re-burning, recycling the weapons, burying them beyond economical recovery, or by disabling them further through other means such as using a sledgehammer;

(iv) An additional consideration should be the fact that unless the country has a well-established steel industry, the scrap value of the burned arms would probably not offset the transportation costs. It would then be best either to bury the scrap or, possibly, to construct a peace monument.

(v) Advantages:

a. Simple and cost-effective;

b. Can be done in or near the collection point;

c. Has minimum training and equipment requirements;

d. High visible impact with psychological and political value;

(vi) Disadvantages:

a. Not always 100 per cent effective in destroying the weapons;

b. Minimal value for resulting scrap;

c. Environmental concerns with temporary air pollution, especially if there are high percentages of plastics and polymers in the weapons;

(b) **Melting in foundries/blast furnaces:**

(i) Where it is possible to utilize electrical, blast or foundry furnaces, this is probably the optimum method of destruction. It inevitably means transporting the weapons over some distance and, as the infrastructure is rarely co-located where the weapons are collected or stored, there will likely be cost concerns. This method also requires a comprehensive destruction plan including stripping the weapons of all non-steel components, making safety checks, providing secure transportation and maintaining oversight of what will essentially be a commercial operation;

(ii) The melting process is technically safe and has minimal environmental impact. It dispenses with the need for any supplementary process, except for stripping the non-metallic parts and ancillary equipment. Depending on the quantity of weapons and the percentage of high-grade steel, there is a good possibility of recycling the molten metal residue. Foundry furnaces might provide their services free of charge in exchange for the residue. This could assist in offsetting transportation and other related costs;

(iii) While it is possible to construct small backyard furnaces to deal with smaller amounts of weapons, other methods of dealing with low volume are likely to be more efficient;

(iv) Advantages:

a. Complete and absolute destruction;

b. Possible cost recovery;

(v) Disadvantages:

a. Requires a fixed facility;

b. Could involve significant transportation costs.

Open-pit detonation

22. Open-pit detonation is a relatively simple exercise, assuming the availability of qualified technicians. Destruction can be effected by laying weapons out in a shallow pit and placing explosive charges so that, in the case of the destruction of assault rifles, the receiver, bolt, barrel and trigger housing would be destroyed. This could be an expensive process unless there are donor charges such as plastic explosives that have been collected as part of a disarmament process. Safety procedures have to be rigid, not just in the handling and use of explosives, but ensuring that adequate safety distances are in place between the demolition site, the personnel involved, the general population and property. There is always the possibility that some weapons or parts might be thrown or kicked out of the pit by the explosion and, in that case, the surrounding area must be thoroughly checked after the blast. In addition, a detailed check will have to be done to ensure complete destruction. These concerns could be minimized by tamping the site with earth, sandbags or water bags. A well-executed procedure would mutilate the weapons beyond reuse.

23. This method is particularly well-suited for the destruction of mortars, anti-tank guns and portable launchers of anti-aircraft missile systems. In addition, small quantities of large calibre weapons can be destroyed by detonating a high explosive charge in the chamber:

(a) Advantages:

(i) Destruction rate is very good, especially for larger weapons;

(ii) Highly visible and has symbolic value;

(b) Disadvantages:

(i) Requires skilled technicians;

(ii) Could involve bringing explosives into an insecure operational area;

(iii) Requires detailed safety procedures;

(iv) Residue must be removed or buried;

(v) There are minimum recycling possibilities;

(vi) The environment could be impacted by noise, air and ground pollution;

(vii) Not cost-effective for destruction of small arms unless there is an abundance of donor charges.

Cutting

24. Cutting has been widely used and can be done in a variety of ways. However, the various methods also produce different outcomes regarding effectiveness. More specifically, the slightly higher-tech methods of using either oxyacetylene torches or

plasma cutters over conventional saw blades leave far fewer possibilities that the disabled weapons can be used for spare parts. In general, when cutting small arms from handguns to assault rifles, the weapons are cut completely through the barrel, receiver, bolt and trigger mechanism. The higher the temperature generated by the cutting device, the higher the damage to the metal and the less chance the weapon or parts can be rebuilt. There are several ways to destroy small arms and light weapons through cutting:

(a) **Oxyacetylene cutting:**

(i) Oxyacetylene cutting is a proven method of destroying all types of weapons. The equipment is relatively simple to use, and personnel can be trained to use it in one day. The equipment needed is available for lease or sale worldwide, and can be transported by helicopter, light aircraft or light truck. Additionally, the torch is almost maintenance free and spare parts are easy to come by in almost every country;

(ii) The cost of an oxyacetylene cutter appropriate for this type of task would be from $200 to $500. There is no electric power requirement;

(iii) The only real disadvantage of this method is the number of weapons that can be destroyed in a given time. The time it takes varies from weapon to weapon based on size. Operator skill and experience also have a bearing on the speed of destruction. The average number of assault rifles that could realistically be destroyed in an eight-hour day would be 300 to 400. Another disadvantage that could arise depending on the situation in which the destruction is being carried out (i.e., whether destruction is done by a mobile unit or at a well-secured stationary site) would be the attractiveness of the equipment to theft. This is a disadvantage for all methods, using any sort of machinery;

(iv) Advantages:

a. Simple, safe and requires little training;

b. Close to 100 per cent effective in rendering weapon useless, especially if two cuts are made;

c. Easily maintained and transported;

d. Environmentally sound despite the generation of some toxic fumes;

e. Some material is available for recycling;

(v) Disadvantages:

a. Time-consuming if a large quantity of weapons is to be destroyed;

b. Labour-intensive;

(b) **Oxygasoline cutting:**

(i) The oxygasoline torch cuts steel using gasoline for fuel, and can be used as a direct replacement for the acetylene torch. The design keeps the fuel as a liquid all the way to the cutting tip, which prevents back-flash down the fuel line since gasoline can not ignite without oxygen. Like oxyacetylene, where certain polymers and plastics are burned, environmental and user health precautions should be taken such as ensuring adequate ventilation and/or the

wearing of an appropriate mask filter. The oxygasoline system has certain advantages over the acetylene torch, including: cutting faster, cutting cleaner (not an advantage for weapons destruction), reduced fuel costs, increased safety and easier fuel storage.

(ii) Advantages:

a. Simple, safe and requires little training;

b. Environmentally sound, despite the generation of some toxic fumes;

c. Cost-effective to operate;

d. Easily maintained and transported;

(iii) Disadvantages:

a. More costly for initial purchase;

b. Time-consuming if a large quantity of weapons is to be destroyed;

c. Labour-intensive;

(c) **Plasma cutting:**

(i) In equipment cost, a plasma cutter is more expensive than an oxyacetylene torch. However, it can do the same job as the torch in about half the time and is easier to use, thus labour costs could be saved. This difference in labour and equipment cost would have to be calculated for the most cost-efficient method. The plasma cutter also makes a much cleaner cut than an oxyacetylene torch. Plasma cuts rather than burns, thus it is best for weapons with high levels of polymers and plastics. It also releases fewer toxic fumes. Because this cleaner cut does not produce the same amount of slag, it may make the pieces more susceptible to repair or re-use. However, this should be of only slight concern, especially when double cuts can be made more efficiently with the plasma cutter;

(ii) The average cost of a plasma cutter is $2,000. It would require 220 volts of electrical current and could be used with a portable generator. A 5-kilowatt generator costs approximately $800. Additionally, the cutter would require an air compressor;

(iii) Advantages:

a. Safe, requires little training;

b. Environmentally sound despite generation of some toxic fumes;

c. Close to 100 per cent effective in rendering weapons useless, especially if two cuts are made;

d. Can do twice the work in the same amount of time as the oxyacetelyne torch;

(iv) Disadvantages:

a. Could be too expensive if used to destroy small quantities of weaponry;

b. A cleaner cut could increase the risk of parts being re-used (only a slight concern);

c. Somewhat labour-intensive;

(d) **Hydraulic shears cutting:**

(i) Numerous police forces around the world have used this method of destruction for collected or seized weapons. Cutting shears provide a simple, environmentally friendly and effective way to destroy weapons of all sizes and types. Additionally, hydraulic shears could destroy thousands of weapons in one day. While this method is simple and efficient, it may also be cost-prohibitive. Shears can cost from $10,000 to $15,000, depending on the power source, the thickness of steel they can bend or cut and how fast they can do the job. The machinery needed can be bought new or used, and can also be custom-designed to fit individual needs (mobile vs. stationary destruction). Although these machines are quite expensive, they are rugged, can cut wood, plastics and polymers, have a long life, are easily serviced, and can take advantage of low-cost labour owing to their ease of use. Thus, hydraulic shears may be a worthwhile investment if a well-planned and sustained weapons collection and destruction programme is to be implemented;

(ii) Hydraulic shears already installed in an existing industrial facility are an attractive option because the capital acquisition cost can be absorbed by an operation other than the destruction operation;

(iii) Advantages:

a. Simple to use and requires little training;

b. 100 per cent effective in rendering the weapons useless if two cuts are employed;

c. Fast, reliable and long-lived;

d. Environmentally benign if the scrap is not buried;

e. Large numbers of weapons can be destroyed;

(iv) Disadvantages:

a. Could be too expensive for small quantities of weapons;

b. High maintenance level;

c. Limitations with some of the heavier small arms and light weapons;

(e) **Other cutting methods:**

(i) There are numerous other "lower-tech" methods that could be used to destroy weapons, such as hack saws, bench saws and band saws. These methods would obviously not be practical for destroying more than a handful of weapons. Advantages to these cutting methods are mobility and low cost. If a collection programme were to move around a country or region, and it were expected to collect only a few weapons at each site, this method might be considered;

(ii) Advantages:

a. Simple to use;

b. Inexpensive;

c. Mobile;

(iii) Disadvantages:

a. Labour-intensive, since only a handful of weapons can be destroyed at a time;

b. Not 100 per cent effective in destroying weapons unless there are numerous cuts.

Bending/crushing

25. The destruction or rendering unserviceable of weapons through bending or crushing ranges from very sophisticated factory-type systems to practical systems in the field:

(a) **Crushing by hydraulic press**

(i) Hydraulic presses may be employed in bending and partly crushing weapons. These presses are typically large, very heavy, fixed-installation machines that require mounting on a solid foundation and an adequate power supply. They also require the degree of maintenance associated with large industrial equipment;

(ii) Weapons would be severely mutilated, however, strict verification would be required to ensure that a pool of spare parts for weapons is not created. Supplementary destruction methods might be required depending on the weapon type or types involved. It is very suitable for anti-tank guns, recoilless rifles, missile launchers and like systems;

(iii) Advantages:

a. High volume;

b. Reliable for most weapons;

(iv) Disadvantages:

a. Requires a supplementary method in certain circumstances;

b. Fuels and lubricants required may be an environmental consideration;

c. Recycling may be restricted owing to the presence of varnish, carbon, plastic, etc.;

(b) **Crushing by vehicles**:

(i) A fairly simple method to at least disable weapons is through the use of heavy vehicles. The most effective vehicles are those with caterpillar tracks and weighing between 30 and 40 tons, e.g., tanks or heavy construction vehicles. One would simply need to have the track pads removed, lay the weapons on a flat hard surface such as asphalt or concrete and run over the weapons with the vehicle several times. Care must be taken to ensure that the weapons are separated far enough to ensure a good heavy run over each one.

Likewise, if the weapons are laid against a curb, log or steel rail, they could be bent or broken using any sort of heavy vehicle. In all cases where supports are used it is necessary to guard against items being thrown up or aside when subjected to pressure. Finally, front-end loader vehicles can use their bucket/blade combination to bend or break weapons in a manner similar to the use of shears;

(ii) A disadvantage to this method is the lack of completeness. This can be overcome by having visual inspections conducted by competent supervisors to determine the number of runs required to destroy the weapons. Additionally, this could simply be an intermediate method to disable the weapons before complete destruction by some other method such as burning;

(iii) Advantages:

a. Simple to execute, minimum training required;

b. Requisite equipment widely available;

c. Inexpensive;

d. High volume of weapons can be destroyed in one day;

e. Environmentally benign if the scrap is not buried;

f. Provides an opportunity for high visual impact with psychological and political value;

(iv) Disadvantages:

a. Not 100 per cent effective in destroying all weapons;

b. Strict verification required;

c. Difficult to do in remote, rural areas;

d. Not practical for wide-ranging mobile destruction plan.

Shredding

26. Of all the methods mentioned, shredding is one of the fastest and most effective for destroying weapons. A large, mobile shredder can literally destroy thousands of weapons per day, and there is absolutely no possibility that any parts could be re-used. Additionally, shredded scrap metal can be recycled to recapture some of the costs of this method, although this would be minimal owing to the lower quality of scrap produced if non-metallic parts are not removed in advance.

27. The primary disadvantages to this method are the expense and availability of the requisite equipment. Even in countries that have established recycling facilities, there are only a few of these machines. The larger ones cost several million dollars. Smaller models in the $350,000 range are also available. This method would only be cost-effective if many thousands of weapons were to be destroyed or if the country had an already well-established shredding and recycling capability:

(a) Advantages:

(i) Simple to use;

(ii) 100 per cent assurance of complete destruction;

(iii) Some costs can be recovered through recycling;

(iv) Can destroy thousands of weapons at a time;

(b) Disadvantages:

(i) Extremely expensive equipment to buy if not already available in-country;

(ii) Mobile systems are limited by rough terrain;

(iii) Not cost-effective for quantities of weapons less than several thousand or that have to be transported over long distances to a fixed facility.

Dumping at sea

28. This method of destruction is often rejected for environmental reasons. While protection of the environment must always be of high importance, there could be circumstances where the method is acceptable. Historically, this has been one of the most frequently used methods and it is, in fact, more environmentally sound than many other methods as it involves only inert metal with small amounts of contaminants. In any case, global, national and regional norms and instruments must be consulted in accordance with the provisions of the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (the London Convention).[9]

29. This method can be expensive, as it requires moving the weapons to a port, packaging them in barrels or sea containers (drilled with holes to ensure that they sink and free air space being filled with concrete ballast), arranging for a ship with onboard crane facilities and passage to an area with a deep ocean trench, i.e., beyond the continental shelf. There are scientific formulas available to calculate the buoyancy and density of the package to be dumped to ensure that it does not float. This is essentially a commercial operation so no training is required. Security prior to dumping and verification that a dump has actually been made, requires a certain amount of planning and resources:

(a) Advantages:

(i) High-volume capacity;

(ii) Recovery virtually impossible;

(b) Disadvantages:

(i) Expensive, depending on volume;

(ii) Logistically difficult;

(iii) No recycling possibilities;

(iv) Negative psychological impact owing to low visibility to the conflict-affected population.

Burial on land

30. This method would normally be supplementary to one of the other methods discussed. In certain circumstances it could be a "stand alone" method if there was sufficient guarantee that the weapons would not be recoverable. This could involve

the use of mines or abandoned quarries/excavations, especially if an explosive blast was used to cover the weapons. Although this method does not actually destroy weapons, it could be combined with embedding the weapons in cement, which would make the possibility of recovery even more unlikely.

31. Burial on land can also be done by placing weapons in a pit, covering them with common salt, replacing the spoil over the weapons and then wetting the area to hasten decomposition. Weapons become unusable within several weeks. Physical security must be maintained until it is certain the weapons have become unserviceable:

(a) Advantages:

(i) Low cost, simple, rapid;

(ii) Could be a supplementary method for scrap residue from other methods;

(b) Disadvantages:

(i) Possible adverse impact on the environment;

(ii) No possibility for recycling;

(iii) Some danger of subsequent recovery.

New technologies

32. New technologies, techniques and equipment are being developed or coming on the market continuously. Planners, managers and trainers would need to monitor these developments and adjust accordingly. One new technology that has been adopted in some countries is described below.

33. Hydroabrasive cutting, sometimes referred to as water-jet cutting, is becoming popular with explosive ordnance disposal teams and demilitarization enterprises. It is very effective in destroying small arms and light weapons, especially those weapons and munitions on the higher end of the spectrum. Its advantages over other torch systems are that it is environmentally sound (there are no toxic fumes) and favours recycling in that the scrap is unaffected by the cutting process. Currently it is more expensive than comparative systems, but this is minimized the larger the number of weapons to be destroyed.

III. Destruction of ammunition and explosives

A. Introduction

34. Safe and successful destruction of ammunition and explosives (often referred to as munitions) should be attempted only by trained professionals who are knowledgeable about the material and the methods of destruction. The following information is general background data that would be useful in setting up, and providing oversight of, munitions destruction programmes.

35. In addition to destruction as part of a peace agreement, munitions may be destroyed as a result of:

(a) The downsizing of military forces, the termination of a conflict or the reduction of a specific security threat;

(b) A change in standard-issue weapons or their calibres;

(c) An end to the useful life of ammunition;

(d) Defective ammunition;

(e) Storage safety problems.

36. In addition to destruction, it should be noted that there is another process available in the case of ammunition. Demilitarization is a process whereby ammunition is stripped down to its component parts and recycled, using as much of the material obtained as is economically feasible. Ammunition factories are increasingly turning to demilitarization as a paying service to customers for whom other methods are not practicable. Demilitarization is a rapid method for disposing of large volumes of surplus ammunition. It is environmentally friendly, provided that the plant is equipped with the elaborate filters and scrubbers required to prevent the escape of toxic fumes. Metals are reused as scrap and high explosive ammunition fillings can be converted into explosives for industrial use. Propellants can be reused if chemically stable. Some firms can provide demilitarization facilities ready for use in a host country or theatre of operations. On the negative side, the process can be expensive, particularly if the ammunition needs to be transported over long distances. Demilitarization is usually employed in the context of stockpile reduction/destruction where volume is a major factor. Although some aspects are related to field destruction, the process of demilitarization is not dealt with in the present report.

B. Methods of destruction

37. There is a wide range of methods available for destruction of munitions. The selection of the most suitable method depends on the target munitions, the quantity to be destroyed, efficiency, cost, qualifications of available personnel, infrastructure available and the time frame involved. Regardless of the method chosen, the safety of personnel, livestock and property is paramount and there are a number of rules that must be applied:

(a) Ensure that permission for destruction has been given by the responsible and competent authority;

(b) Know the target munition, both the item being destroyed and, where applicable, the explosives used to destroy it. Unless the design characteristics of both are known, it would not be possible to determine a safe and effective method of destruction;

(c) Plan the task carefully, work out the plans and procedures in advance of arrival at the destruction site;

(d) Create and maintain a safe working environment;

(e) Prepare clear and unambiguous orders and ensure they are understood by all personnel involved;

(f) Ensure that safety takes priority over speed and short cuts;

(g) Clear the destruction site of all hazards and contamination on completion of the task.

38. When selecting a destruction site, there are a number of characteristics to be considered. In order to reduce hazards caused by flash, heat, blast, noise, ground shock and fragments, an isolated area with good road access is ideal. Deep soil with minimum rocks and stones is desirable. High ground with good drainage is a major asset, assuming that the danger area is not compromised by the height. The site should minimize the chance of secondary fires. Radio and radar transmitters should be at a distance where they do not interfere with firing mechanisms at the site.

Detonation

39. Detonation involves the use of high explosives to destroy munitions stocks. This method can handle large amounts of munitions but it can be expensive and labour-intensive, especially for large volumes or for widely dispersed stocks. The expense can be minimized when it is possible to use donor charges from collected/surrendered stocks. It is often the preferred method of destroying stocks of larger-calibre ammunition, especially that filled with high explosive and white phosphorus. Small quantities of other natures — smoke, pyrotechnics, lachrymatory — can also be disposed of by inclusion in mixed stacks during large-scale detonations. It is also useful in dealing with munitions whose transport would be dangerous (such as blinds, or severely corroded ammunition).

(a) Open-pit detonation. This method is effective in dealing with missile and rocket systems, all calibres of ammunition for small arms and light weapons, hand grenades, detonators and detonating cord. Depending on the munitions being dealt with, it can require a large area surrounding the destruction site for safety purposes. The danger area is determined by the maximum range of fragments or blast, depending on the type of ammunition. Material thrown out or kicked out can be minimized by tamping techniques such as the use of earth, water bags or sandbags to cover the targeted munitions, as well as steel mats and grills. There would be an impact on the environment, including short-lived air pollution. More seriously, there is the possibility of ground pollution through incomplete detonation and residue, such as white phosphorus. As mentioned earlier, but particularly in open-pit destruction, consideration must be given to noise, ground shock and reflection of blast effects by low cloud cover and geographic features. Some scrap might remain for recycling;

(b) Contained detonation. This method involves destruction in a contained chamber or some geographical feature, such as a tunnel or cave. There is minimal pre-processing of the targeted munition. A wide range of munitions can be accommodated, although usually with a limit of 15 kilograms of net explosive content in a contained chamber. A high volume of donor charges is required for each detonation. This method is more environmentally sound than open-pit detonation, as many contained detonation chambers include natural or manufactured pollution control systems. There are minimal recycling possibilities, and when tunnels or caves are used, it is not possible to guarantee completeness of the operation.

Burning

40. Burning is very effective in dealing with bagged or loose propellant, smoke, pyrotechnic and lachrymatory munitions. It is also an alternative to detonation for certain explosives although it is less clean:

(a) Open-pit burning. This method is low cost, quite simple to execute and suitable for propellants, pyrotechnics, primers, fuses, signal and illumination flares, powder and propellants and packing material. The munitions should be removed from their packing material in the pre-processing stage. Combustion can be assisted with the addition of such fuels as gasoline and kerosene. The disadvantages of this method are its clear environmental unfriendliness — toxic fumes and possible ground contamination — and the fact that explosives can burn to detonation. The possibility of detonation means that the same cleared safety area is required as for destruction by detonation. Opportunities for recycling are minimal;

(b) Contained burning/incineration. Incineration is the controlled burning of ammunition in a specially designed oven or furnace (e.g., burning boxes, cages, kettles) capable of containing the effects of the explosions entailed. While such furnaces can be simple field incinerators, which are cheap, efficient and mobile, they tend to have a small or moderate capacity and are somewhat environmentally unfriendly because of the noxious fumes that are a by-product of burning ammunition and pyrotechnics. Furnaces are only capable of incinerating ammunition for small arms and light weapons up to .50 calibre, pyrotechnics and packing materials.

Chemical neutralization

41. Chemical neutralization consists of mixing the target material, primary explosives, with small quantities of substances that act chemically to transform the material to an inert state. Substances that can be used include sodium hydroxide, sodium dichromate and hydrated sodium sulphide. This method is often complemented with incineration. Although primarily an industrial-type method very suitable for demilitarization tasks, chemical neutralization can be used in the field assuming sufficient preparation time (munitions preparation, site weatherproofing, etc.) and chemical expertise.

Burial on land

42. Burial on land is sometimes a controversial method of destruction but it may have to be reverted to in some circumstances. Proportionality and an examination of which method is the "lesser evil" is important in making decisions on the use of dumping. Burial in disused mine shafts and volcanoes can often simplify the process. Burial on land is cheap and can accommodate large volumes of ammunition, but its drawbacks are its environmental unfriendliness and the danger posed if the ammunition is subsequently uncovered.

Firing

43. Ammunition for small arms and light weapons can be destroyed by firing it using the parent weapon, especially if the parent weapon is going to be destroyed as well and there is no concern with "barrel life". For certain munition types, such as 30 mm cannon shells, which are difficult to deal with, it is the preferred method. In

all cases, care must be taken to ensure that the operator is familiar with the particular weapon system and that the ammunition has been checked to ensure it meets all safety requirements.

IV. Other considerations

A. Introduction

44. In addition to adherence to the principles discussed in section I above, there are a number of other considerations to be reviewed when developing destruction programmes. Some of those considerations are discussed below.

B. Ancillary equipment destruction

45. Ancillary equipment is defined as items related to a particular weapons system, such as spare parts, telescopes and mounts, night vision aids, cleaning kits, etc. Spare parts for weapons systems, per se, must be destroyed. Some items may have other peaceful uses, such as batteries for night vision aids. Burning is probably the most effective method of destroying ancillary equipment, although radioactive materials require separate handling.

C. Scrap recycling

46. Recycling the scrap from weapons destruction programmes has had indifferent results in terms of cost recovery, but there have been some exceptions. The exceptions are, for the most part, related to stockpile destruction programmes rather than field operations. In the former case, tenders have been issued for bids on destroyed weapons. Prices are variable depending both on market demand and the quality of the metal offered. It has been suggested that since much of the steel from weapons is chromium, molybdenum and nickel alloy, it should command a premium price if uncontaminated. On the other hand, some steel mills claim that the metal from light weapons is inferior and want to charge for recycling rather than pay.

47. Over the past few years, new small arms and light weapons have been developed that contain less steel and more plastics and polymers than their predecessors. This development means that the weapons will not be as attractive for recycling purposes and will have less cost recovery potential when destroyed.

48. Turning to ammunition, although brass shell cases from the higher-calibre weapons — clean, fired and without primers — would fetch a good price, small arms casings would bring a much lower price. However, shell casings with a high silicon content are apparently in demand. Some high explosive can be converted for industrial use, albeit with results less effective than commercial explosive.

49. Price is a variable, depending on market requirements and location. If the cost of transport is equal to or more than that offered, it is obviously not a worthwhile proposition to attempt recycling for cost-recovery purposes. This may be a particular problem in certain developing countries that lack recycling facilities and a good transportation network. Notwithstanding, in countries that have a recycling capability, it appears possible that an aggressive marketing campaign by the

authorities in disposing of weapons and ammunition might meet with some success. This can be approached on two levels — the actual value of the product and the community service/public relations aspect of contributing to improving the security situation in a given State.

D. Safe handling

50. Ideally, weapons technicians (armourers) should be available to supervise the safe handling of weapons. In the event they are not available, all personnel involved should consider the following four rules of weapons safety:

(a) Whenever picking up a weapon, assume that it is loaded and dangerous;

(b) When handling a weapon, control the direction of the muzzle at all times;

(c) Never touch a trigger or other firing mechanism;

(d) Open the action and check for the presence of ammunition.

51. It should never be assumed that engaging the safety mechanism on a weapon will prevent it from accidental discharge. Certain weapon designs are notoriously unreliable. Some older weapons can discharge if dropped or hit sharply. Also, on well-worn weapons the safety mechanism can deteriorate to the point where it will not prevent discharge of the bullet. Unless knowledgeable on how to operate a particular model of weapon, personnel must assume that a weapon is loaded and dangerous.

52. Ammunition and explosives are inherently more dangerous to handle than inert weapons. Assessing the condition of ammunition and explosives requires specialized expertise and should not be attempted by those not qualified to do so.

E. Transport

53. Unless collection and destruction are carried out on site, it is necessary to transport the collected weapons, ammunition and explosives safely to the storage or destruction site. Weapons, ammunition and explosives should be transported separately, preferably in different vehicles. In addition to the vehicles transporting collected weaponry, a vehicle-mounted security party should accompany the convoy.

54. Vehicles used for transport must be serviceable and equipped with fire extinguishers. At least one set of documents accounting for the items being carried should be with the convoy commander. Qualified ammunition and explosives technicians should accompany the vehicles.

55. Vehicle security should always be a high priority. In the event of a breakdown or stop for any reason, vehicles must not be left unattended. Security personnel should contact the relevant authorities if an unscheduled stop occurs. There can be no smoking or fire within 50 metres of a loaded vehicle at any time. Loading and unloading should be carried out in secure areas with qualified technicians present. Convoy routes should avoid insecure, congested and built-up areas whenever possible.

56. If an accident occurs:

(a) The vehicle should be isolated by closing the road in both directions and a buffer zone created between the vehicle and any people in the area;

(b) Qualified ammunition and explosive technicians, medical personnel and fire prevention and response officials must be notified;

(c) Any injured personnel should be evacuated and treated immediately;

(d) The accompanying technicians, on the basis of an assessment, can organize any necessary unloading or other safety measures;

(e) Burning vehicles should be abandoned and observed from a distance unless there are personnel still inside and rescue is required.

57. In the case of transboundary movements of ammunition and explosives, obligations under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal[10] might apply, i.e., prior informed consent, movement documents, etc. Triggering the control system under the Convention leads to environmentally sound management.

F. Storage

58. It is important that the collected weapons, ammunition and explosives be stored safely. Storage buildings, rooms or containers should be secure, dry and without any electrical appliances or supply except for that of lighting. Storage should be in an isolated area without trees and overhead power cables. It is understood that under certain circumstances all of the conditions noted may not be achievable, but, when all of them can be met, the likelihood of accidents is reduced considerably. Some form of firefighting equipment should be close to the storage facility.

59. The storage area should be secured by a locking system and the physical presence of guards. By doing this, irregularities and pilferage can be prevented.

60. Weapons, ammunition and explosives should be stored separately in different buildings, containers or rooms. If this is not possible, they should be separated by a barrier of some kind, such as sand bags or wooden boxes filled with dry sand.

G. Special ammunition and explosives storage considerations

61. If many types of ammunition and explosives need to be stored, the ammunition should if possible be divided and separated into the following four categories:

(a) Category I: ammunition with high explosive risk:

- High capacity shells
- Grenades
- Demolition explosives
- Mortars
- Rocket motors
- Detonators of all types

– Mines

(b) Category II: ammunition with burning or fragmentation risk:

– Armour piercing bullets

– Cartridge cases with propellant

– 20 mm-37 mm HE shells/rounds

(c) Category III: ammunition with only burning risk:

– Bagged propellant charges

– Loose propellant

– Rocket motors without warheads

– Pyrotechnics

(d) Category IV: ammunition with little or no hazard:

– Small arms rounds (bullets)

62. The above categories are not complete, and often judgements must be made as to what type of ammunition is involved. Ammunition with particular storage and fire risk, such as white phosphorous, can cause dreadful burns to the skin. In such cases a large container of water should be kept nearby to immerse the ammunition in case it begins to leak.

63. Should adequate storage facilities be available, the following rules should be observed:

(a) Do not mix the different categories;

(b) If the category of an item of ammunition is not clear, it should be stored as Category I;

(c) If there is only one room for storage, items in each category should be placed in different parts of the room;

(d) There should be no fuse detonator/igniter left in any ammunition if it can be removed by hand, such as unscrewing the fuses, etc.;

(e) When detonators are stored, they should be separated from all other types of ammunition, whatever their categories;

(f) Detonators, when possible, should be stored in closed metal boxes to prevent electrical static as they are very sensitive to friction heat;

(g) Smoking or fire must not be allowed within 50 metres of the area;

(h) All magazines from weapons should be emptied and stored separately;

(i) Any directional weapons, such as rocket propelled grenades (RPGs) should be placed with the warhead facing out of the stack and away from occupied areas;

(j) If the storage area contains different types and categories of ammunition, boxes of Category IV ammunition may be used as a wall between them to prevent fragments from igniting other types of ammunition or explosives;

(k) Should a fire start, personnel should vacate the storage area until a fire brigade arrives.

64. The foregoing list is for conceptual guidance and planning purposes only. Any programme that stores weapons, ammunition and explosives must have the support of qualified personnel. Temporary storage is only a short-term measure. As soon as possible, all weapons, ammunition and explosives should be moved to a destruction site.

H. Training

65. Safe and efficient destruction of weapons and munitions require personnel trained in three different categories: management, technical expertise and general labour. Managers would be responsible for the planning, oversight and quality assurance of destruction programmes; and technical expertise will include military ammunition technical officers, explosive ordnance and weapons technicians, other qualified technicians and their civilian equivalents. These first two categories should have received their training and experience through formal national programmes. They might require some refresher training and familiarity with the particular geographical and operational situation where the destruction programme is to be carried out. It is essential that managers and supervisors are satisfied with the level of qualification and experience of their staff. A rigorous selection process should be in place at the time the destruction teams are being formed.

66. On-site training is required for non-expert labourers — ideally drawn from the local population. Safety and consideration for the environment are major factors in such training. Equipment operators, local and expatriate, should be trained on any commercial equipment utilized. Supervisors at all levels must be responsible for training standards.

V. Conclusions and recommendations

A. Introduction

67. The present report has been prepared in response to a request by the Security Council as described in section I above. It agrees that there is a requirement for a reference manual for use in the field in support of weapons destruction programmes to ensure the disposal of weapons voluntarily surrendered by civilians or retrieved from former combatants. Since the final manual will evolve over its span of development, the following conclusions and recommendations are of an interim nature.

B. Conclusions

68. With respect to the present report, the technical experts conclude that:

(a) While the President of the Security Council, in his statement on behalf of the Council of 24 September 1999 (see annex I) did not make specific mention of the destruction of ammunition and explosives, the intent was to include methods for the destruction of ammunition and explosives related to small arms and light

weapons in the requested reference manual, particularly due to the fact that ammunition and explosives are included in the definition of small arms and light weapons;

(b) As ecologically safe methods of destruction are probably not achievable without significant cost, unless there is an adequate economy of scale, it is more realistic to look for environmentally responsible or environmentally sound methods;

(c) The terms "environmentally responsible" and "environmentally sound" take into account proportionality, i.e., decisions involving destruction would weigh the cost, time, effectiveness, etc., of one method over the other, against the need to achieve and demonstrate a peace or arms control/disarmament agreement. In other words, the rule of "better is often the enemy of good enough" needs to be observed;

(d) Destruction options must be part of operational planning for disarmament, demobilization and reintegration programmes from the very beginning. Methods, manning and equipment, along with the necessary financing, must be considered;

(e) Cost-effectiveness, both direct and indirect, is difficult to assess as it is dependent on the destruction method employed, economy of scale, the local recycling market price and transportation costs. Further, significant cost recovery through scrap recycling is not likely, although the environmental benefit is high;

(f) Whenever possible, advantage must be taken of the existing infrastructure;

(g) Psychological factors are important in destruction planning and, in this regard, ceremonial destruction has a role to play in contributing to long-term peace and security;

(h) It would be difficult, if not impossible, to develop a reference manual for use in the field that could incorporate all the technical detail related to possible methods of weapons destruction, considering the wide range of small arms and light weapons, the associated ammunition and explosives, and the related safety precautions;

(i) A reference manual for planners and managers, however, incorporating those practical methods with a good chance of being selected for use, e.g., those discussed in the present report, would make a significant contribution to the successful implementation of destruction programmes.

C. Recommendations

69. With respect to the reference manual, the technical experts recommend that:

(a) A United Nations reference manual for use in the field be prepared, with the emphasis on planning, management and supervision;

(b) The field reference manual be supplemented by military/civilian manuals dealing specifically with particular methods of destruction of weapons, ammunition and explosives (the supplementary manuals already exist in the form of military and commercial publications);

(c) The field reference manual should include a number of annexes, such as a glossary of terms, abbreviations and acronyms, and equipment references;

(d) The format of the field reference manual accommodate both durability and flexibility in its design. A loose-leaf, three-ring binder utilizing plasticized pages would be the optimum;

(e) The field reference manual should be maintained on the United Nations homepage on the Internet (http://www.un.org) in the official languages of the United Nations and updated so as to allow the user to print new or revised pages and insert them into the manual.

Notes

[1] Large destruction programmes (more than 20,000 tons) specifically targeted at ammunition and explosives would make environmentally sound destruction a practical and cost-effective option.

[2] See David DeClerq, "Destroying Small Arms and Light Weapons, Survey of Methods and Practical Guide", BICC report No. 13, April 1999 (http://www.bicc.de/publications.html).

[3] See the joint BICC/MIIS publication, "Tackling Small Arms and Light Weapons: A Practical Guide for Collection and Destruction", February 2000 (http://sand.miis.edu/projects/guide.htm).

[4] See John Napolitano and Kenn Underwood, "Final report, Gramsh Pilot Weapons in Exchange for Development Project, UNDP Albania, September 2000". Available from UNDP Albania (kunderwood@icc.al.eu.org).

[5] In accordance with the guidelines, containing the terms of reference for technical experts, which were transmitted by the Secretariat to the experts, the first task of the experts was to provide comment and input to the outline of the report. The second task was to provide comment and input on the draft report. The terms of reference noted that after consideration of the comments on the draft report, the consultant would finalize the text.

[6] A/52/298, 27 August 1997 (http://www.un.org/Depts/dda/CAB/rep52298.pdf). See annex II for the definition of small arms and light weapons.

[7] See Adrian Wilkinson, "Stockpile destruction of anti-personnel landmines: UNDP guidelines", 20 May 2000.

[8] (http://domino.un.org/TreatyStatus.nsf).

[9] Opened for signature at London, Mexico City and Washington, D.C., on 29 December 1972 (http://untreaty.un.org).

[10] http://untreaty.un.org.

Annex I

Statement by the President of the Security Council on behalf of the Council dated 24 September 1999[a]

At the 4048th meeting of the Security Council, held on 24 September 1999 in connection with the Council's consideration of the item entitled "Small arms", the President of the Security Council made the following statement on behalf of the Council:

"The Security Council recalls its primary responsibility under the Charter of the United Nations for the maintenance of international peace and security, in view of which its attention is drawn inevitably to small arms and light weapons as the most frequently used weapons in the majority of recent armed conflicts.

"The Security Council notes with grave concern that the destabilizing accumulation of small arms has contributed to the intensity and duration of armed conflicts. The Council also notes that the easy availability of small arms can be a contributing factor to undermining peace agreements, complicating peace-building efforts and impeding political, economic and social development. In this regard, the Council acknowledges that the challenge posed by small arms is multifaceted and involves security, humanitarian and development dimensions.

"The Security Council is deeply concerned that countries involved in, emerging from, or close to protracted armed conflicts are particularly vulnerable to violence resulting from the indiscriminate use of small arms in armed conflict. In this regard, the Council recalls the report of the Secretary-General on the Protection of Civilians in Armed Conflict of 8 September (S/1999/957) and its resolution 1265 (1999) of 17 September 1999.

"The Security Council emphasizes that the right of individual and collective self-defence recognized in Article 51 of the Charter of the United Nations and the legitimate security demands of all countries should be fully taken into account. The Council recognizes that small arms are traded globally for legitimate security and commercial considerations. Bearing in mind the considerable volume of this trade, the Council underlines the vital importance of effective national regulations and controls on small arms transfers. The Council also encourages the Governments of arms-exporting countries to exercise the highest degree of responsibility in these transactions.

"The Security Council emphasizes that the prevention of illicit trafficking is of immediate concern in the global search for ways and means to curb the wrongful use of small arms, including their use by terrorists.

"The Security Council welcomes the various initiatives that are currently under way, globally and regionally, to address the issue. These initiatives at the regional level include the Economic Community of West African States moratorium on the production and trade in small arms, the Inter-American Convention Against the Illicit Manufacturing and Trafficking in Firearms, Ammunition, Explosives and Other Related Materials, the European Union

[a] S/PRST/1999/28.

Joint Action on Small Arms and the European Union Code of Conduct on Arms Exports. At the global level, the Council welcomes the negotiation process on the elaboration of an international convention against transnational organized crime, including a draft Protocol Against the Illicit Manufacturing of and Trafficking in Firearms, Ammunition and Other Related Materials.

"The Security Council emphasizes the importance of regional cooperation in tackling the issue of illicit trafficking in small arms. Initiatives, such as the work done by the Southern African Development Community and the Southern African Regional Police Commissioners Coordinating Organization, illustrate how regional cooperation can be harnessed to tackle small arms proliferation. The Council recognizes that while regions may sometimes benefit from the experiences of others, one region's experience cannot be extended to others without taking into account their different characteristics.

"The Security Council also welcomes and encourages efforts to prevent and combat the excessive and destabilizing accumulation of and illicit trafficking in small arms and invites Member States to involve civil society in these efforts.

"The Security Council notes with satisfaction the growing attention paid within the United Nations system to the problems associated with the destabilizing accumulation of small arms. The Council welcomes the initiative by the Secretary-General for Coordinated Action on Small Arms (CASA), designed to ensure a coherent and coordinated approach to the small arms issue within the United Nations system.

"The Security Council notes that although the humanitarian impact of small arms in a conflict situation is verifiably serious, a detailed analysis is not available. The Council therefore requests the Secretary-General to specifically include the humanitarian and socio-economic implications of the excessive and destabilizing accumulation and transfer of small arms and light weapons, including their illicit production and trade, in relevant studies he is currently undertaking.

"The Security Council calls for effective implementation of arms embargoes, imposed by the Council in its relevant resolutions. The Council encourages Member States to provide the Sanctions Committees with available information on alleged violations of arms embargoes and recommends that the Chairmen of the Sanctions Committees invite relevant persons from organs, organizations and Committees of the United Nations system, as well as other intergovernmental and regional organizations and other parties concerned, to provide information on issues relating to the implementation and enforcement of arms embargoes.

"The Security Council also calls for measures to discourage arms flows to countries or regions engaged in or emerging from armed conflicts. The Council encourages Member States to establish and abide by voluntary national or regional moratoria on arms transfers with a view to facilitating the process of reconciliation in these countries or regions. The Council recalls the precedents for such moratoria and the international support extended for their implementation.

"The Security Council recognizes the importance of incorporating, as appropriate, within specific peace agreements, with the consent of the parties, and on a case-by-case basis within United Nations peacekeeping mandates, clear terms for the disarmament, demobilization and reintegration of ex-combatants, including the safe and timely disposal of arms and ammunition. The Council requests the Secretary-General to provide the negotiators of peace accords with a record of best practice based upon experience in the field.

"The Security Council requests the Secretary-General to develop a reference manual for use in the field on ecologically safe methods of weapons destruction in order better to enable Member States to ensure the disposal of weapons voluntarily surrendered by civilians or retrieved from former combatants. The Council invites Member States to facilitate the preparation of such a manual.

"The Security Council welcomes the recommendations of the Group of Governmental Experts on Small Arms (A/54/258), including the convening of an international conference on the illicit arms trade in all its aspects no later than 2001, noting the offer by Switzerland to host the conference. The Council encourages Member States to participate actively and constructively in the conference and any preparatory meetings, taking into account the recommendations contained in this Statement, with a view to ensuring that the conference makes a meaningful and lasting contribution to reducing the incidence of illicit arms trafficking."

Annex II

Definition of small arms and light weapons

1. Small arms and light weapons are used by all armed forces, including internal security forces for, inter alia, self-protection or self-defence, close or short-range combat, direct or indirect fire, and against tanks or aircraft at relatively short distances. Broadly speaking, small arms are those designed for personal use and light weapons are those designed for use by several persons serving as a crew. While small arms and light weapons are designed for use by armed forces, they have unique characteristics that are also of particular advantage for irregular warfare or terrorist and criminal action. Specifically, and drawing from the 1997 report of the Panel of Governmental Experts on Small Arms (A/52/298, para. 27):

(a) An individual can carry small arms for personal use, while light weapons can be handled by two or more people serving as a crew, a pack animal or a light vehicle. They allow for highly mobile operations;

(b) Mortars, rockets and grenade launchers or mounted anti-aircraft guns often constitute the main armament of light forces, providing them with high firepower that often causes heavy casualties among the civilian population if used indiscriminately;

(c) Their relatively low cost in comparison to other conventional arms make them affordable to many actors beyond the State;

(d) Since many small arms require little, if any, maintenance, they can essentially last forever. They can be hidden easily and even young children can use them with minimal training.

2. The Panel of Governmental Experts (A/52/298, annex, para. 26)[a] contains definitions for the following categories of small arms and light weapons, including ammunition and explosives:

(a) **Small arms**:

- Revolvers and self-loading pistols;
- Rifles and carbines;
- Sub-machine-guns;
- Assault rifles;
- Light machine-guns;

(b) **Light weapons**:

- Heavy machine-guns;
- Hand-held, under-barrel and mounted grenade launchers;
- Portable anti-aircraft guns;
- Portable anti-tank guns and recoilless rifles;
- Portable launchers of anti-tank missile and rocket systems;

[a] (http://www.un.org/Depts/dda/CAB/rep52298/pdf).

- Portable launchers of anti-aircraft missile systems;
- Mortars of calibres of less than 100 mm;

(c) **Ammunition and explosives**:

- Cartridges (rounds) for small arms;
- Shells and missiles for light weapons;
- Anti-personnel and anti-tank grenades;
- Landmines;[b]
- Mobile containers with missiles or shells for single-action anti-aircraft and anti-tank systems;
- Explosives.

[b] For the purposes of the present report, as explained earlier, landmines are not included.

Annex III

Format of the reference manual

1. The following pages illustrate a possible partial layout of the proposed United Nations field reference manual. It selects one method of destruction of small arms and light weapons, cutting; one cutting technique, oxyacetylene; and one weapon type, assault rifles.

2. It is envisaged that the field reference manual will follow the general form of the present report, i.e., it will provide an overview of the major considerations in devising a destruction plan for small arms and light weapons and associated munitions. Separate components will cover the detail of weapons and munitions destruction. In addition, and as suggested in section I of the present report, the manual will include annexes dealing with terminology and information on access to industry with respect to the acquisition of equipment.

Cutting

Methods

3. There are several methods that can be used to cut or sever a weapon. The means discussed herein are:

(a) Oxyacetylene cutting;

(b) Oxygasoline cutting (not included in this model);

(c) Plasma cutting (not included in this model);

(d) Hydraulic shears cutting (not included in this model).

4. Other cutting torches include oxy-propane and natural gas. In addition to the above tools, a number of cutting blades ranging from hacksaws to electrically run circular carbide saws may be used. As these methods are relatively slow and require no specific training they will not be addressed in the present manual.

5. Basic characteristics of the aforementioned cutting equipment, including general safety concerns, are contained in the appropriate appendices (appendix II to the present annex in the case of this model). This information is for general background use only and should not be used as a definitive reference for safety and procedures for any cutting device.

6. For detailed operating procedures and safety, reference must be made to the specific operating manuals that come with each system. There are numerous video-cassette safety lessons available for purchase (including from several Internet web sites). All new equipment comes with safety and operating manuals. In addition, qualified instructors are available in most areas. Where first-time users or novices are employed to cut small arms and light weapons, safety courses must be conducted. For the purpose of disabling or destroying weapons, most of these cutting systems (basic operating procedures and safety) can be taught in an eight-hour day. The table below provides a subjective and general comparison for each system. Before a decision is made on which system to employ, manufacturers should be consulted.

Comparative characteristics[a]

Attributes	*Oxyacetylene*	*Oxygasoline*	*Plasma*	*Shears*	*Saws (various)*
Speed per weapon	30-60 seconds	15-30 seconds	15-30 seconds	2-10 seconds	30-90 seconds
Safety concerns	Low — user burns and explosion	Very low — user burns, minimal explosion	Torch burns only	Cutting blade user only	Cutting blade user only
Toxic fumes (depends on small arms and light weapons composition)	Minor — laminates and synthetics that burn or puddle	Minor — as for oxyacetylene	Cuts synthetics. Does not burn. Less than oxy torches	No	No
Capital cost (United States dollars)	200-500	800-1,200	2,500-5,000	10,000-20,000	400-1,000
Operating cost per weapon, no labour	10-20 cents	5-15 cents	5-10 cents	A few cents each	5-20 cents
Skill level	Moderate	Moderate	Moderate	Low for user	Low for user
Portability	100-200 kg with tanks	25-70 kg, with tanks	100-200 kg, no generator	1,500-4,500 kg, no generator	25-75 kg, no generator
Power requirements	None	None	Electricity: 220/380/415 volts	Electricity: 220/380/415 2/3 phase	Electricity: 110/220 volts

[a] These comparisons are subjective, simplistic and general and may not apply in all circumstances. Operator skill, type and composition of small arms and light weapons, site organization and custom/used equipment availability and ancillary equipment will all affect attributes. All costs are United States dollar estimates.

Weapons cutting/severing process

7. Regardless of which method is used to cut a weapon, the cutting placement is approximately the same. The examples contained herein (see appendix I) include the most common small arms usually found within a micro-disarmament scenario. There is also an example of the "bull pup"-type assault weapon now in, or entering the inventory of, many military and resistance forces.

Weapons preparation

8. For ease of work and to ensure that manuals will not continuously have to be referred to, destruction sites should divide the weapons stocks into stacks or groups of the same type (e.g., all AK-47s and AK-74s should be divided into one group and all HK-G3s and G-36s into another group). This means that once cutting begins, similar groups of weapon should be completed before moving on to another. Because each type of weapon is unique regarding thickness and composition of

material, cutting all the same type in sequence will minimize the adjustment of the cutting torch techniques and fuel feeds, resulting in efficiencies of burn and greater speed.

Weapons safety

9. At this stage, if not already completed and certified, all weapons should be "proved" (checked) to ensure they contain no ammunition. This includes removing magazines, and in accordance with appropriate safety considerations, cocking the weapon to ensure there is no round of ammunition in the chamber. Magazines and ancillary equipment such as slings, optical sights, bayonets, etc., along with any retrieved ammunition, should be placed in separate piles or boxes for later disposal or destruction. Before cutting, all working parts should be forward and all removable breechblocks should be in place. Each destruction site should have a safety officer appointed to be responsible for all aspects of on-site safety. In some cases a safety officer for weapons and a safety officer for cutting equipment might be advisable.

Recycling preparation

10. In some cases, for recycling purposes, or to speed up the actual cutting process, particularly if a two-cut system is going to be used, it might be useful to remove wooden or synthetic material making up the fore and butt stocks. While this procedure is generally not required and can be time-consuming, where labour cost is not a concern and where there are recycling possibilities, it is certainly worth considering. For example, the figure below shows an AK-47, one of the more common small arms relevant to any micro-disarmament programme. Two screws (one on the top and one at the bottom) hold the wooden butt, while internal steel spring clamps hold on the wooden fore stock, permitting removal by hand. The wooden pistol grip should also be removed. In some cases, where removal is difficult, cutting the butt stock near the receiver with a circular saw could be considered.

AK-47, Union of Soviet Socialist Republics 1953

Source: Weapon courtesy of the Royal Canadian Mounted Police Forensics, Ottawa.

Cut location

11. One-cut. The cut on any weapon should ensure that sufficient damage occurs to the rifle chamber (where the bullet sits for firing), the breech, including the firing pin, bolt or breechblock, and the locking lugs. The cut should ideally completely sever the weapon and, where feasible, include secondary damage to the magazine locking device, bolt ways and any portion of the gas operating systems on gas-operated self-loading rifles and machine guns. The figure above shows the cut placement for an AK-47. Appendix I shows the cut placement on various small arms by way of a diagonal marking using a one-cut system to ensure maximum damage to the weapon in question. The requirement to cut the chamber on the rifle barrel is important as rifle barrels on most military small arms can be changed with simple tools such as a wrench and a vise. Thus, a rifle barrel that is not damaged can be reused to replace a damaged barrel or to construct a crude homemade weapon.

12. Two-cut. A two-cut approach may be useful when using shears. As these are normally high speed, making one cut every few seconds, accuracy of cuts may not be obtainable to the same degree as using various cutting torches. In this case, one cut through or near the chamber on the rifle barrel will ensure that the barrel is inoperative. A second cut through the receiver near the trigger assembly and bolt/breechblock/ejection port area will minimize the likelihood of sufficient important spare parts being available to reconstruct a weapon.

Cutting set-up

13. To assist the cutting torch operators in ensuring the proper areas are cut, the following should be considered:

(a) Weapons of the same type should be cut/destroyed consecutively;

(b) A holding device for the weapons should be constructed to ensure that the weapon does not move during the cutting procedure;

(c) A template for each weapon type can be constructed, in conjunction with a holding device to lie on or underneath the weapon to highlight the cut area;

(d) A model cut for each type of weapon could be near the cutter for instant reference;

(e) Periodic spot checks by a supervisor are advisable;

(f) Where cutting torches are used, a stand with a brick or similar covering substance speeds up the heating process.

Other small arms and light weapons

14. Light weapons such as mortars and tube-launched anti-armour and anti-aircraft weapons may be more easily destroyed through crushing — particularly if there is a large quantity to be destroyed. Crew-served weapons such as medium and heavy machine-guns are best disabled/destroyed with two cuts — one at the barrel chamber and one through the feed/ejection port and firing pin. Whatever the weapon to be destroyed, a picture or template that shows where a cut or cuts should be made is required. These can be developed by any qualified armourer familiar with the characteristics of a given weapon system.

SINGLE CUT PLACEMENT ON SELECTED SMALL ARMS[1]

7.62 mm FN (C1) – Made in Canada

7.62mm HK G3 11/78 - Made In Germany

[a] All firearms shown are courtesy of the Royal Canadian Mounted Police Forensics, Ottawa.

5.56 mm Colt M16 A1 - Made in USA

9mm Uzi Model A – Made In Israel (IMI)

9mm MP5 KAL - Made In Turkey

5.56 mm Steyr-Mannlicher GES. M.B.H. AUG - Made In Austria

Appendix II

Oxyacetylene

General

1. The oxyacetylene torch is a basic thermal cutting technique that can be used on carbon steel up to 3 to 4 inches thick. Cutting speeds of up to 10 inches per minute can be obtained; the speed is a function of the material thickness and geometry. The torch burns the metal and coatings, producing smoke and fumes. Where certain polymers and plastics are burned environmental precautions may have to be taken, such as ensuring adequate ventilation and/or the wearing of an appropriate mask filter.

General safety tips

2. General safety tips include:

- Never allow oxygen to contact oil, grease or other flammable substances;
- Use the proper regulator for each specific gas;
- Only qualified technicians should repair a regulator;
- Keep regulators free of oil, grease and other flammable substances;
- Check that valves stop reverse gas flow — they do not act as a fire stop;
- Never starve a tip, this can cause a flashback;
- Always keep cylinders in an upright position;
- Never stand in front or behind a regulator when opening the cylinder valve;
- Do not open an acetylene valve more than 1.5 turns;
- Always make sure the area is safe and flammable free;
- Never mix brands;
- Purge the lines before and after usage;
- Always wear protective clothing;
- Use proper eye protection;
- If flashback occurs, immediately turn off the oxygen, then the acetylene, and allow unit to cool;
- Always work in a well ventilated area;
- Always light the acetylene first;
- Oxygen cylinders must be opened up all the way;
- Use an approved striker, never use matches or a cigarette lighter.

Cutting tips

3. There are numerous cutting tips available and the manufacturers recommendations should be requested for the best means of cutting small arms and light weapons.

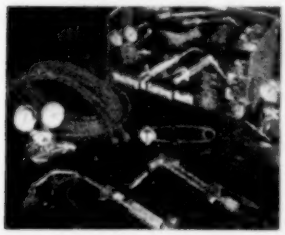
Cost

4. Oxyacetylene hoses, valves and torches can be purchased for between $200 and $300 (see figure below). Purchase does not include the oxygen and acetylene tanks with gases. These are normally leased with two medium tanks priced at about $50 a year. Refills cost approximately $50 for acetylene and $20 for oxygen. A cutting rate of 15 to 20 hours can be expected from two medium tanks. The cutting ratio use of oxygen and acetylene is approximately two oxygen: one acetylene. This would necessitate a change of tank every 10 hours for oxygen and every 20 hours for acetylene. Thus, for initial purchase and refills of equipment the cost for cutting some 10,000 firearms might be from $00.15 to $00.18 per firearm. The above prices vary from region to region and would be dependent on the skill of the operator and the type of firearms to be destroyed.

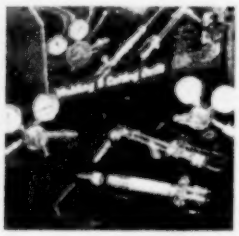
Slag

5. Slag is a byproduct of cutting with oxyacetylene and is often the reason why alternative cutting methods are sometimes sought. In the case of firearms the resultant slag merely contributes to ensuring that the cut pieces are less useful for reconstruction. Hence, slag should be seen as assisting in the destruction of the weapon.

Typical oxyacetylene equipment and accessories



MQT-21012



MQT-21013

ATD-37250

MQT-20022

Reference and contact:

American Welding Society
550 NW LeJeune Road
Miami, FL 33126
Tel: (305) 443-9353
Fax: (305) 443-7559
E-mail: webmaster@aws.org
URL: www.aws.org

Annex IV

List of governmental experts

The present report was prepared with the assistance of a number of governmental experts who were appointed on the basis of their technical expertise. Their contributions, as well as those of the members of the Coordinating Action on Small Arms, have been reflected in the report to the extent possible.

Captain Ricardo Cuellar Mangandi
Specialist in arms and ammunition destruction
Armed Forces Logistical Support Command
San Salvador, El Salvador

Lieutenant Colonel Oscar Osvaldo Giacomelli
Warhead Department Manager
CITEFA
Buenos Aires, Argentina

Brigadier-General C. E. Giles
Director, Product Support
Defence Logistics Formation
Pretoria, South Africa

Colonel Serge Jop
Head of the Armament and Ammunition Office
Technical Sub-Direction
Central Direction of Equipment
French Army
Paris, France

Colonel Ko Bog-nam
Chief, Ammunition Division, Logistics Bureau
Ministry of National Defence
Seoul, Republic of Korea

Evgeniy D. Litovchenko
Technical Expert
Federal State Unitary Enterprise BAZALT
Russian Ammunition Agency
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Long Yuan
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PLA University of Science and Technology
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Major A E A Wilkinson MBE MSc MIExpE
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Ministry of Defence
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Colonel Y. M. Yaduma
Headquarters
Department of Army Operations
Lagos, Nigeria

Consultant:

Colonel (Retd) Douglas Fraser
Executive Director
Canadian Council for International Peace and Security
Ottawa, Canada